

No. 659,667.

Patented Oct. 16, 1900.

J. HARMON & A. T. FAY.

LADDER.

(Application filed Apr. 4, 1899.)

(No Model.)

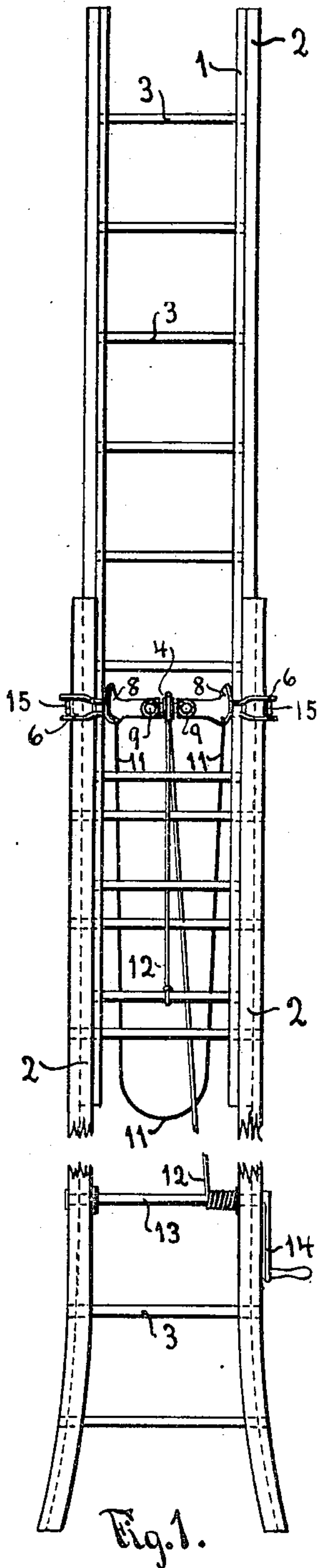


Fig. 1.

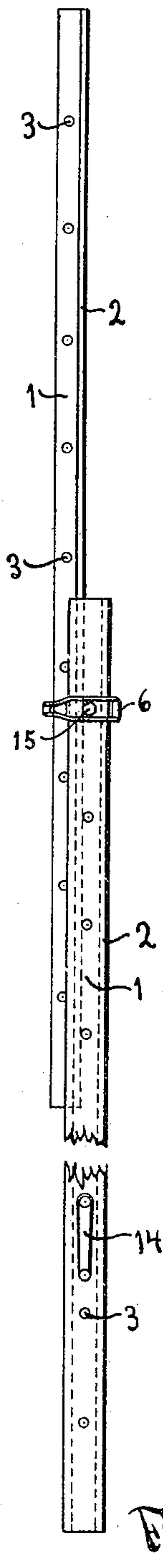


Fig. 2.

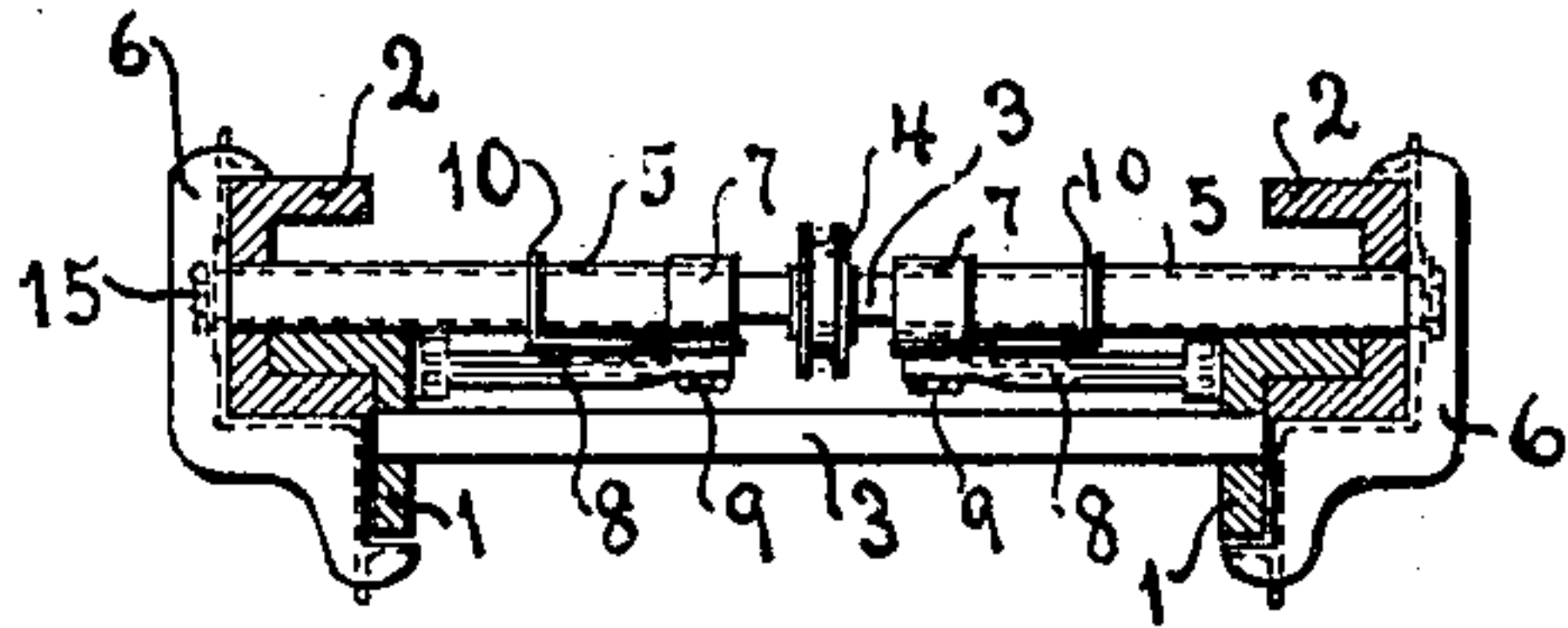


Fig. 3.

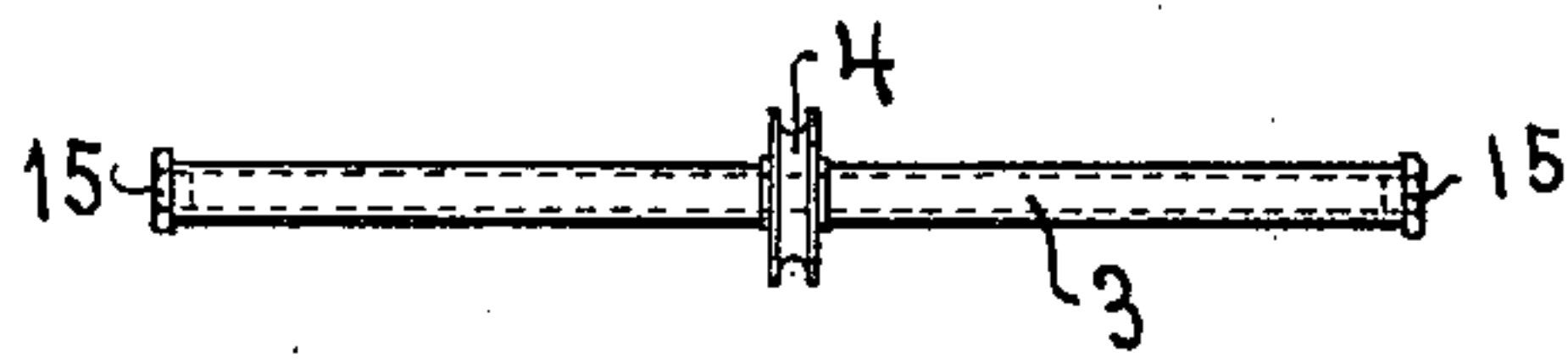


Fig. 4.

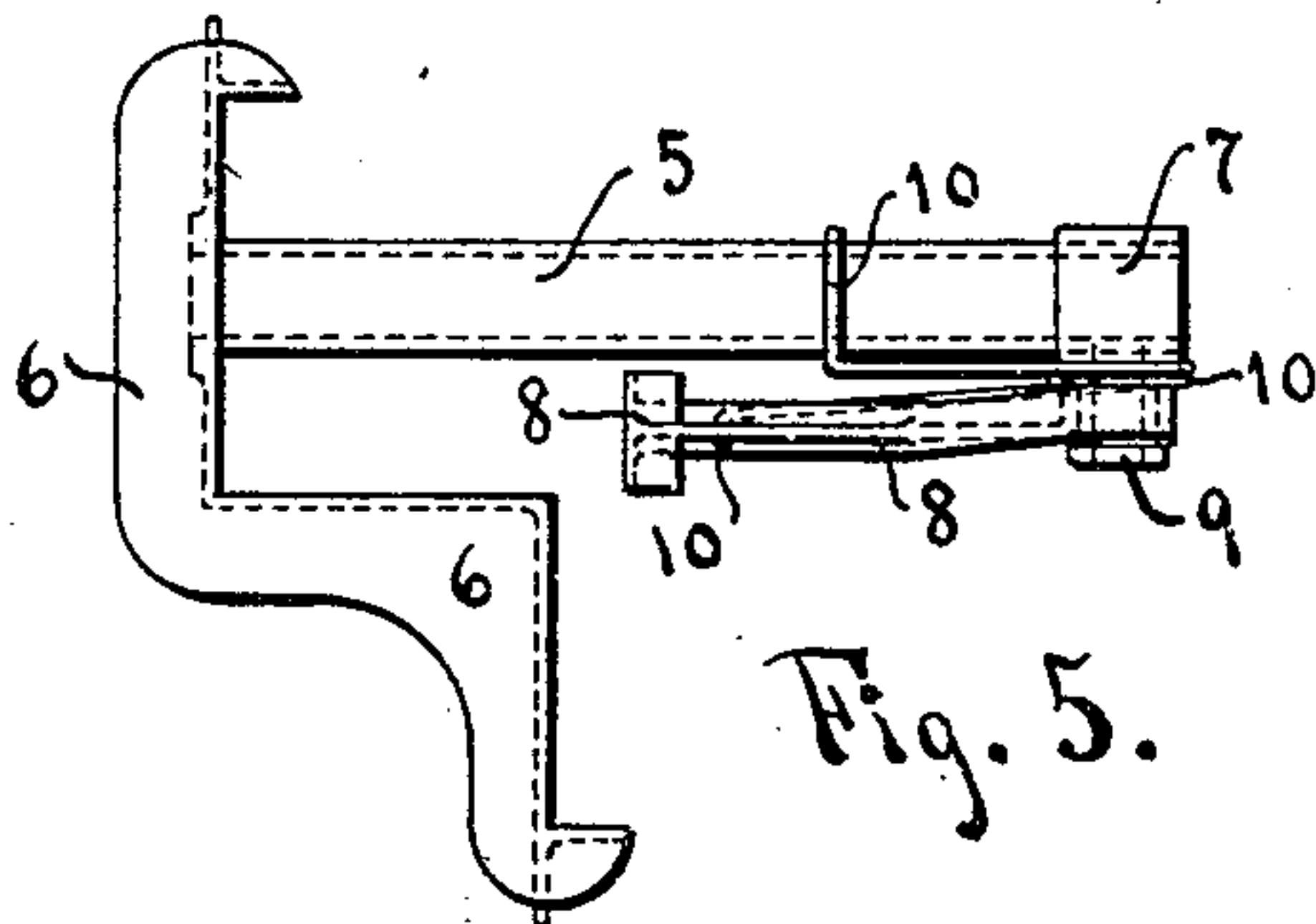


Fig. 5.

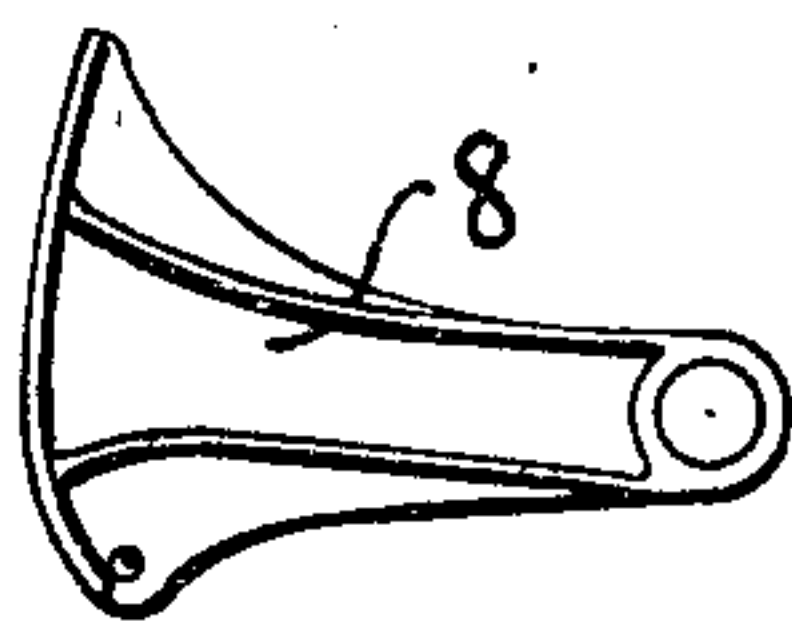


Fig. 6.

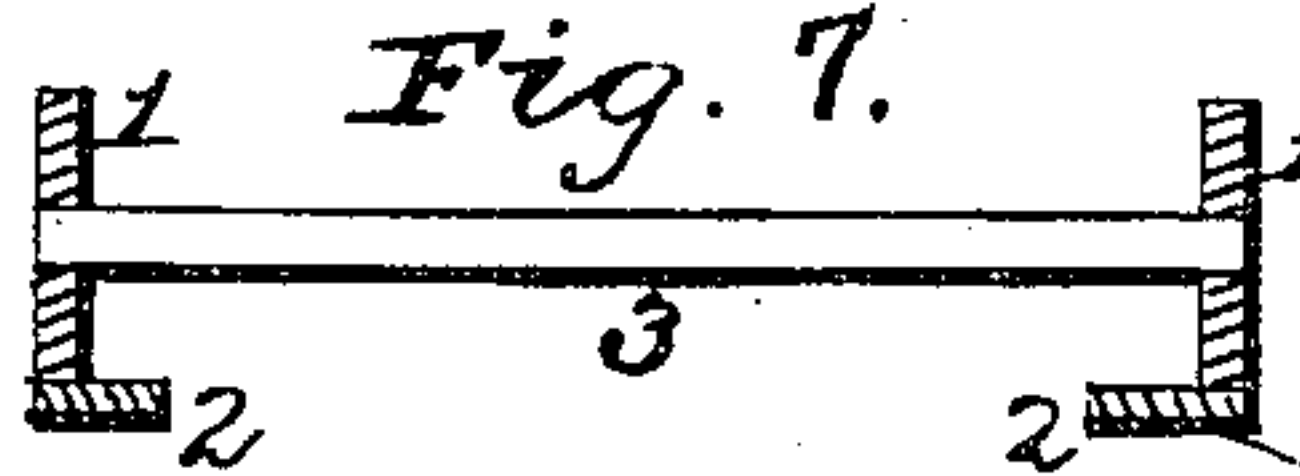


Fig. 7.

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UNITED STATES PATENT OFFICE.

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LADDER.

SPECIFICATION forming part of Letters Patent No. 659,667, dated October 16, 1900.

Application filed April 4, 1899. Serial No. 711,728. (No model.)

To all whom it may concern:

Be it known that we, JOHN HARMON and ALBERT T. FAY, citizens of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented a new and useful Improvement in Ladders, of which the following is a specification.

Our invention relates to improvements in ladders having rungs or cross-bars held in side frames; and the objects of our improvement are, first, to provide a frame possessing great strength and lightness; second, to provide an improved extension on the main ladder, and, third, to provide means for raising, lowering, and securing the extension in place. We attain these objects by the mechanism shown in the accompanying drawings, in which—

Figure 1 is a front elevation of our ladder and extension complete; Fig. 2, a side elevation of the same; Fig. 3, a cross-section through the ladder and extension; Fig. 4, the top round of the main ladder with a sheave thereon; Fig. 5, a detail showing a plan view of the devices for securing the extension in place; Fig. 6, a detail showing the locking-cam. Fig. 7 is a cross-section of a modified form of the ladder.

Similar numerals refer to similar parts throughout the several views.

The frame of our ladder comprises the ordinary bar 1, which is reinforced by a bar or bars 2, firmly secured to bar 1 throughout their length, bar 2 extending inward or outward and having its greatest width at right angles to that of bar 1. Where an extension is to be employed, we place upon the center of the upper round of the main ladder a loose sheave 4. Over each end of this round a tube 5 is received, said tube being provided at its outer end with shoulders 6, whose inner surfaces conform to and are in contact with the outer surface of the ladder-frame, which it embraces, as shown in Fig. 3. Upon the inner ends of the tube 5 are sleeves 7, to each of which sleeves is loosely pivoted a locking-cam 8, and the cam is held upon said sleeve and said sleeve secured to the tube by suitable means, such as cap-screw 9. The cams 8 are so adjusted as to come in contact with the inner surfaces of the extension

portion of the ladder at each side. A suitable spring 10 engages the locking-cam 8 and tends to lift the cam upward. A cord 11 is secured to each of the locking-cams 8, and a rope 12 may be secured at one end to the lower rung of the extension, and after passing over the sheave 4 the other end of said rope may be secured to the round 13 of the main ladder, as shown in Fig. 1. This latter round may be formed and secured in the ladder-frame to operate in the manner of a windlass and provided with a crank-handle 14. The tubes 5, with their shoulders 6, may be held in position by means of a screw-cap 15.

The operation of the extension-ladder is as follows: The extension-section of the ladder is received within the frame of the main section of the ladder, in which the former freely slides up and down, as shown in Figs 1, 2, and 3. The extension may be raised or lowered by means of the windlass 13 and will be held securely in any position by the cams 8 engaging on the inner surfaces of the frame of the extension, weight upon the extension only tending to make the cams and shoulders grasp and hold the two frames more securely together in the position desired. When it is desired to adjust the extension to a new position, the same is first lifted slightly to loosen the engagement of the cams, when the springs 10 operate to elevate the cams just sufficiently to free them from contact with the ladder-frame. The extension may then be lowered or further raised to the new position desired, when the locking-cams will again be brought into engagement by a slight downward pull upon the cord 11.

It will be seen that our means for securing the extension in place enable that to be done at any point, and that point is in no way dependent upon the position of the ladder-rungs, that such means is very secure, strong, and easy of manipulation, and that the main ladder and extension frames are so formed and interlocked as to combine exceptional strength with exceptional lightness.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In an extension-ladder, the tubes 5, the shoulders to which the outer ends of the tubes are secured, and which shoulders conform to the outer surfaces of the ladder-frame which

they embrace, and the sleeves 7, combined with the round 3 provided with a loose sheave at its center, substantially as shown.

2. In a ladder, the combination of a main ladder, an extension whose side frames are adapted to slide freely upon the frame of the main ladder, and means for securing the extension upon the main ladder, said means consisting of a head and a locking-cam, both secured to one section of the ladder, and a spring adapted to move the locking-cam to a position free from contact with the ladder-frame, when such cam is not tightly engaged, substantially as shown and described.

3. In a ladder, the combination of a main ladder, an extension whose side frames are adapted to slide freely upon the frame of the main ladder, and means for adjusting and securing the extension upon the main ladder, said means consisting of a head, a locking-cam, a spring adapted to move the locking-cam to a position free from contact with the ladder-frame when such cam is not tightly engaged, and a cord so secured to the cam as to be adapted for engaging the cam with the ladder-frame, substantially as described and shown.

4. In a ladder, the combination of a main ladder, an extension whose side frames are adapted to slide freely upon the frame of the main ladder, and means for adjusting and securing the extension upon the main ladder, said means consisting of a head, a locking-

cam, a spring adapted to operate upon the locking-cam, a sheave and a windlass, substantially as specified.

5. In a ladder, the combination of a main ladder-section, an extension adapted to slide upon the frame of the main ladder, and means adapted for securing the extension in position, said means consisting of a tube adapted to be received upon a ladder-rung, a locking-cam pivoted to said tube, a spring adapted to operate upon the locking-cam, and a head secured to the outer end of said tube, substantially as set forth.

6. In a ladder, the combination of a main ladder E-shaped in cross-section, an extension which is L-shaped in cross-section and adapted to slide upon the main ladder, and means adapted for securing the extension in position, said means consisting of a head and pivoted locking-cam united together and adapted to grasp and hold the frames of the main ladder and extension between said head and cam, and a spring adapted to operate upon said cam, substantially as shown and described.

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